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Salinity, Temperature and Density Data for the Canadian Beaufort Sea Shelf, March 1988

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Department of Fisheries and Oceans
Winnipeg, Manitoba R3T 2N6

December 1988

Canadian Data Report of Fisheries and Aquatic Sciences No. 712

Fisheries and Oceans Pêches et Océans

Canada

89-01255/

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by

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This is the 27th Data Report
from the Central and Arctic Region, Winnipeg

PREFACE

This study was funded by the Northern Oil and Gas Action Program (NOGAP), through the Department of Fisheries and Oceans, Central and Arctic Region. It is one of a series of projects being executed under NOGAP B.2, to provide background data for assessing the implications of hydrocarbon development and production on critical estuarine and marine habitats of the Canadian Arctic Coastal Shelf. This document constitutes NOGAP Report B2.40.

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Cat. no. Fs 97-13/712E ISSN 0706-6465

Correct citation for this publication is:

Hopky, G.E., D.B. Chiperzak, and M.J. Lawrence. 1988. Salinity, temperature and density data for the Canadian Beaufort Sea Shelf, March 1988. Can. Data Rep. Fish. Aquat. Sci. 712: iv + 17 p.

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ABSTRACT

Hopky, G.E., D.B. Chiperzak, and M.J. Lawrence. 1988. Salinity, temperature and density data for the Canadian Beaufort Sea Shelf, March, 1988. Can. Data Rep. Fish. Aquat. Sci. 712: iv + 17 p.

This report contains salinity, temperature and density (CTD) data collected by the Department of Fisheries and Oceans, Central and Arctic Region in the waters of the Canadian Beaufort Sea Shelf during March 1988. Salinity and temperature profile data were measured using a Guildline Model 8870 probe deployed from the ice surface. Ice thickness was measured. Density was calculated using salinity and temperature values.

CTD profiles were measured at five stations. The maximum depths of profiles measured from the ice surface ranged from 3.1 to 16.8 dbar. Salinity and temperature measurements ranged from 0.35 to 34.83, and -1.87 to 1.08°C, respectively.

Key words: Arctic; coastal waters; salt-wedge estuaries; fresh water; saline water; thermocline; halocline; pycnocline; oceanographic data; light penetration.

RÉSUMÉ

Hopky, G.E., D.B. Chiperzak, and M.J. Lawrence. 1988. Salinity, temperature and density data for the Canadian Beaufort Sea Shelf, March, 1988. Can. Data Rep. Fish. Aquat. Sci. 712: iv + 17 p.

Ce rapport renferme des données sur la salinité, la température et la densité (CTD) qui ont été recueillies par le ministère des Pêches et des Océans, région du Centre et de l'Arctique, dans les eaux du secteur canadien du plateau de la mer de Beaufort au cours de l'année 1988. Les données des profils de salinité et de température ont été obtenues à l'aide d'un sonde Guildline, modèle 8870, utilisée à partir de la glace. La densité a été obtenue par calcul au moyen de la salinité et de la température.

Les profils CTD ont été mesurés à cinq (5) stations. Les profils mesurés à partir de la couche de glace l'ont été à des profondeurs variant de 3,1 à 16,8 dbar. Les mesures de salinité et de température variaient respectivement de 0,35 à 34,83 et de -1,87 à 1,08°C.

Mots-clés: Arctique; eaux côtières; lame d'eau salée dans l'estuaire; eau douce; eau saline; thermocline; halocline; pycnocline; données océanographiques; pénétration de la lumière.

INTRODUCTION

The salinity, temperature and density (CTD) data presented in this report were collected as part of the Critical Arctic Estuarine and Marine Habitat Project (B.2) of the Northern Oil and Gas Action Program (NOGAP). The data represent one component of a suite of oceanographic measurements made by the staff of the Department of Fisheries and Oceans (DFO), Central and Arctic Region on the Canadian Beaufort Sea Shelf (Fig. 1) during March 1988.

Field studies for the NOGAP B.2 project began in 1984 and were completed in March 1988. The CTD data presented here completes the documentation of all such data gathered from the Canadian Beaufort Sea Shelf during this period. The CTD results for 1984, 1985, 1986 and 1987 were published in Hopky et al. (1986, 1987, 1988).

A major objective of Project B.2 is to identify and characterize estuarine and marine habitats of significance to the biological communities, primarily fish, inhabiting the Beaufort Sea Shelf. Salinity, temperature and density data will assist in the identification and delineation of potential habitat types. In addition, light attenuation (PAR - Photosynthetically Active Radiation), and nutrient and other chemistry related data were gathered. Concurrent biological sampling included: chlorophyll a, primary production studies, and life history studies of the zooplankton, ichthyoplankton and adult fish (e.g. Lacho 1986) communities.

A DH6 (Twin Otter) aircraft equipped with wheels, a self-contained mobile field camp, and trucks were used during March to conduct sampling from the ice surface. The data reported here are from an area that extends from Pullen Island on the west to Amundsen Gulf on the east, out to approximately the 20 m isobath (Fig. 2).

METHODS

The methods of data collection and data processing described below follow those utilized in 1984 and 1985 (Hopky et al. 1986), 1986 (Hopky et al. 1987), and 1987 (Hopky et al. 1988).

DATA COLLECTION

Positioning

In March all stations except the two noted below were reached with a Twin Otter aircraft equipped with Global Navigation System (GNS) positioning equipment. Station 88001 was reached with a mobile field camp. It was sampled coincidental with another ongoing NOGAP B.2 research subproject. The station position was located relative to adjacent stations of known location. Station 88002 was reached using trucks. Its position was located by aircraft flypasts, utilizing the GNS.

CTD system

Station profiles were measured using a Guildline Model 8870 portable CTD system consisting of a probe, winch and deck unit. An Arctic Model probe was used. Sensors on these probes measure temperature (°C), salinity and depth, as pressure (dbar), with an accuracy of ±0.02, ±0.04 and ±1% full scale, respectively. Calibration tests conducted prior to their use resulted in acceptable accuracies.

The winch was a 12/24 volt powered Arctic Model equipped with a single conductor oceanographic cable. Cable deployment rate was 0.35 $m \cdot sec^{-1}$.

The deck unit consisted of a power supply module and a display module. Power was provided by 2-12 volt batteries connected in series. Raw, serial data was recorded on magnetic tape using a portable audio cassette recorder. The display module provided a digital display of all channel outputs. A microprocessor in the display module calculated salinities using the UNESCO practical salinity scale 1978 (UNESCO 1981).

DATA PROCESSING

Transfer of the CTD data from the audio tape, and its subsequent editing and reduction were made using a Zenith 151 microcomputer with programs written by DFO staff at the Freshwater Institute, and Dbase III software. CTD data were fed from the audio tape back into the Guildline deck unit, processed through an IEEE488 interface board located in the display module and subsequently stored on 5.25 inch floppy disks. Means of salinity and temperature were calculated for multiple readings at a single depth (dbar) point. Density, in $kg \cdot m^{-3}$, was calculated using the international equation of state of seawater 1980 (UNESCO 1981). SAS Version 5.16 was used to generate data tables and data figures on a VAX/VMS 11 computer.

RESULTS

A summary of all stations sampled on the Beaufort Sea Shelf during 1988 is shown in Table 1, with locations shown on Fig. 2. CTD profiles were measured at five stations. Station depths ranged from 4.0 to 18.0 m and were sampled between 1500 and 1930 hours Greenwich mean time (Gmt). Ice thickness was also measured (Table 1). The maximum CTD profile depth is indicated.

CTD data are tabulated by station and date in Appendix A, Tables A1.1-A1.5. Plots of the data are shown on the facing page with the corresponding station number and sampling date. Density, in $kg \cdot m^{-3}$, is plotted as sigma t (density - 1000). Depths are expressed in pressure units (dbar). The maximum depths of profiles measured from the ice surface ranged from 3.1 to 16.8 dbar (Appendix A). Salinity and temperature measurements ranged from 0.35 to

34.83, and -1.87 to 1.08°C, respectively. Note that CTD profiles were measured from the air/ice surface (dbar = 0.0). Historically (Hopky et al. 1986, 1987, 1988), we have reported similar profiles from the ice/water interface.

ACKNOWLEDGMENTS

The authors would like to thank R. Sauvé, from DFO Winnipeg, for her assistance in the data collection. Twin Otter pilot was B. Gordon. Their considerable skills and dedication are gratefully acknowledged.

We thank the Polar Continental Shelf Project of the Department of Energy, Mines and Resources, Tuktoyaktuk, N.W.T., for logistic support.

Assistance of DFO support staff, K. Klann and C. Catt at the Freshwater Institute, Winnipeg, is appreciated. M. Capel and M. Bergmann, also of DFO Winnipeg, developed the software necessary to read CTD data from the Guildline/audio format into a microcomputer/floppy disk format.

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Table 1. Summary data for all stations sampled in the Beaufort Sea during 1988.

Station	Latitude Deg	Min	Longitude Deg	Min	Date Sampled	Gmt*	Total Depth (m)	Ice Depth (m)	Secchi Depth (m)	CTD** Profile	Profile Depth (Dbar)
88001	69	34.0	134	04.5	Mar 17	1500	18	1.3		Yes	16.8
88002	69	34.8	133	16.1	Mar 20	1600	4	1.5		Yes	3.1
88003	69	56.8	133	45.3	Mar 21	1700	13	1.4		Yes	12.3
88004	70	10.2	131	12.7	Mar 22	1630	18	0.7		Yes	16.8
88005	70	25.3	127	28.1	Mar 23	1630	17	0.7		Yes	16.8
88002	69	34.8	133	16.1	Mar 24	1930	4	1.5		N/A	

* Gmt - Greenwich mean time.
** CTD - Conductivity, Temperature, Density.
*** N/A - Not Available; BCP - Bottle Cast Profile.

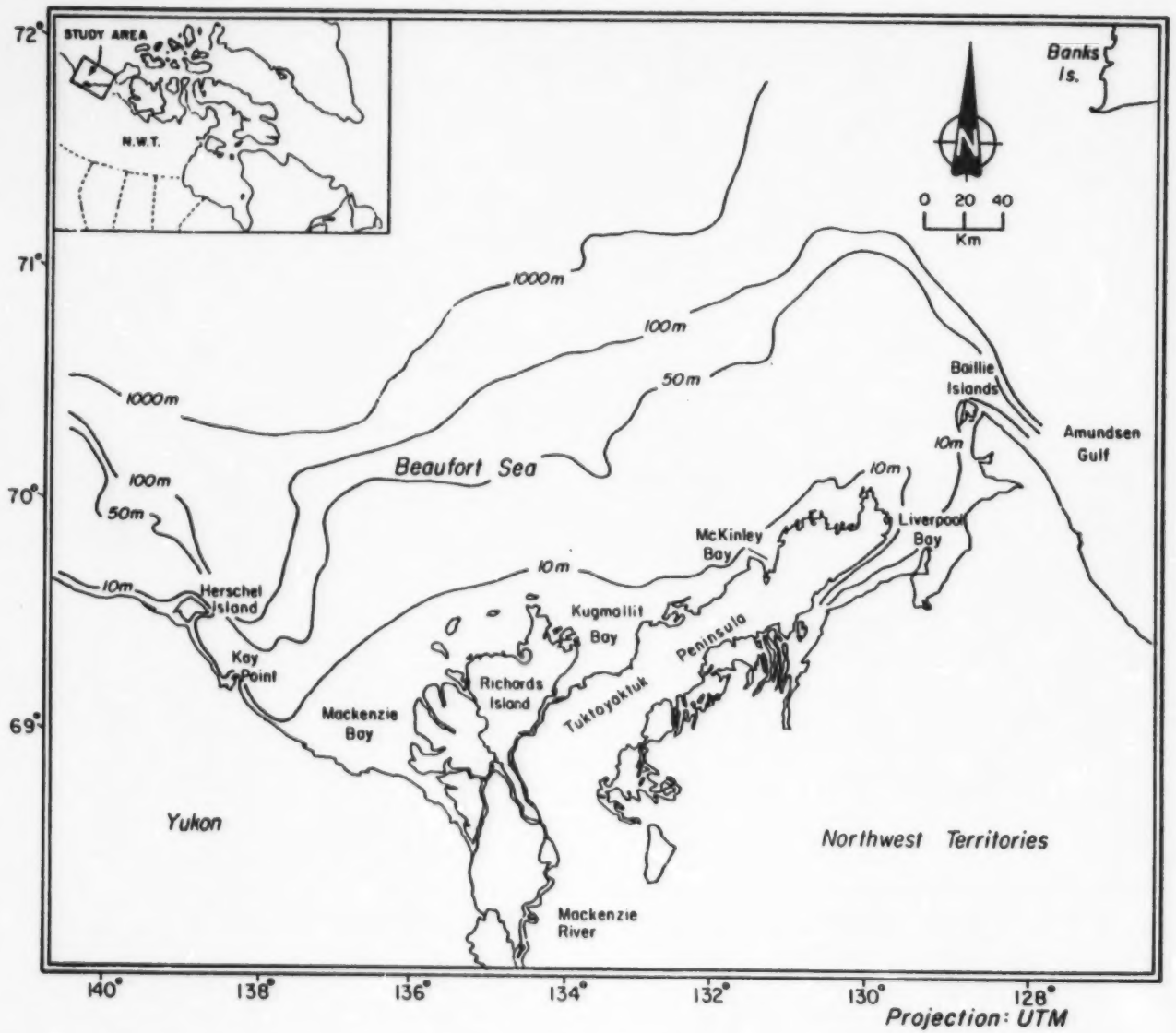

Fig. 1. Location and detailed map of Beaufort Sea study area.

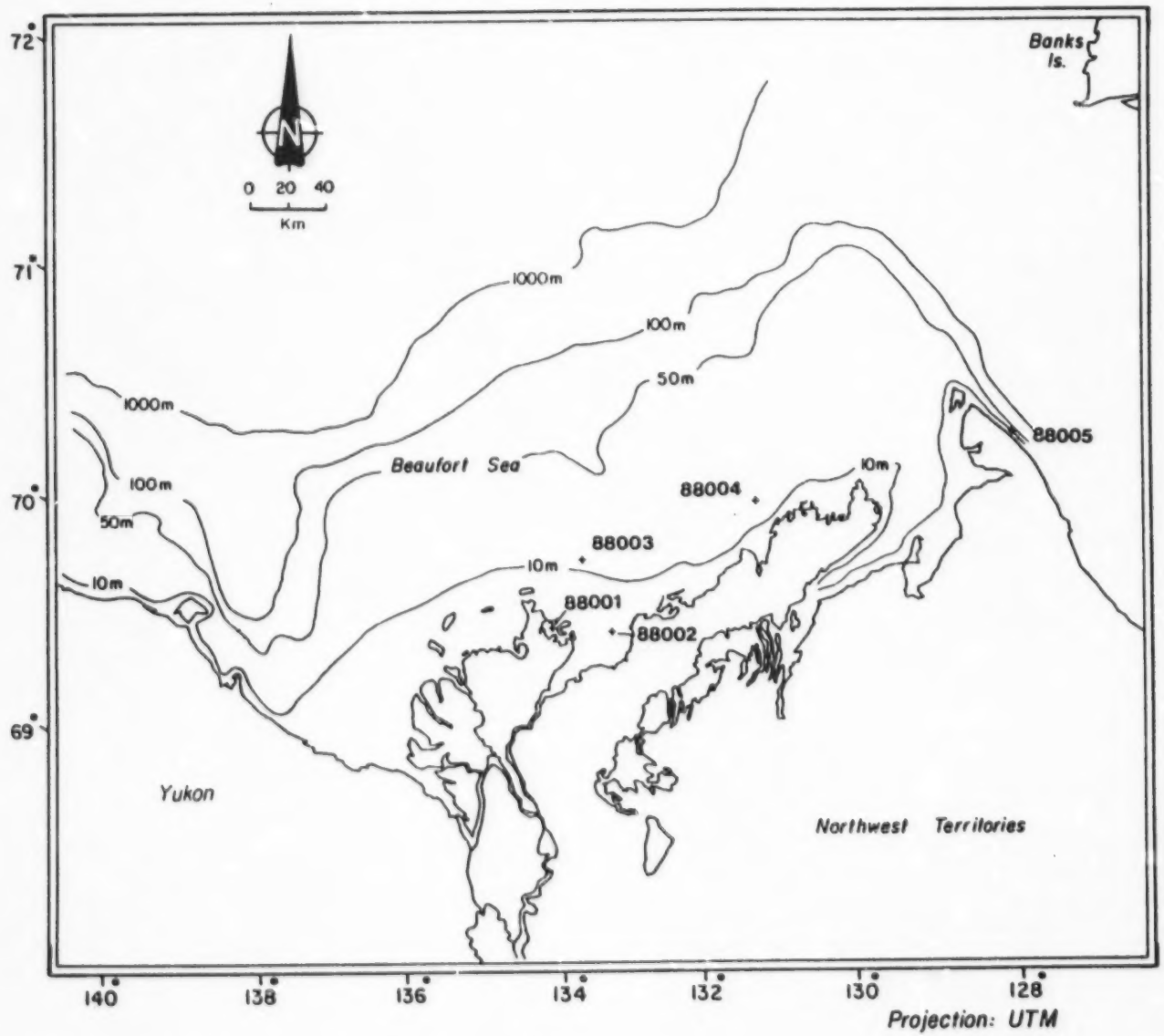

Fig. 2. Stations sampled in March, 1988.

APPENDIX A

CTD data tables and plotted profiles.

Note: In Tables A1.1 to A1.5 the notation: kg•m**-3

is interpreted as: $kg \cdot m^{-3}$.

STATION: 88001 DATE: 17 March

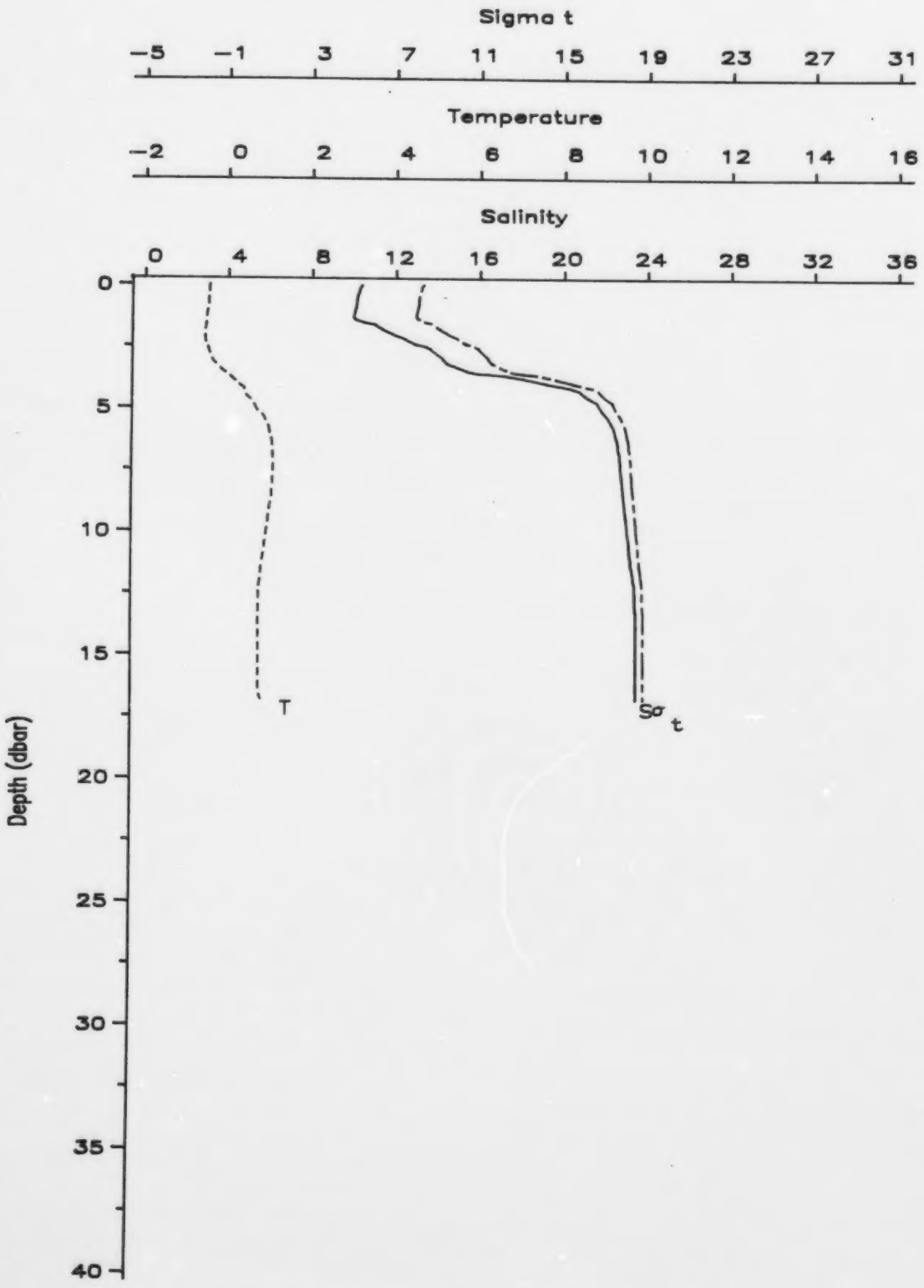

Table A1.1. Salinity, temperature (C) and density (kg.m**-3) data by depth (dbar) for station 88001, March 17, 1988.

Depth	Salinity	Temperature	Density	Depth	Salinity	Temperature	Density	Depth	Salinity	Temperature	Density
0.0	10.37	-0.47	1008.24	6.1	22.44	1.00	1017.96	12.2	23.39	0.75	1018.73
0.1	10.26	-0.48	1008.15	6.2	22.47	1.02	1017.98	12.3	23.39	0.75	1018.73
0.3	10.20	-0.48	1008.10	6.3	22.52	1.04	1018.02	12.5	23.41	0.74	1018.74
0.4	10.14	-0.49	1008.05	6.5	22.57	1.06	1018.06	12.6	23.41	0.74	1018.74
0.6	10.09	-0.49	1008.01	6.7	22.59	1.07	1018.08	12.7	23.41	0.74	1018.74
0.9	10.05	-0.50	1007.98	6.8	22.63	1.07	1018.11	12.8	23.41	0.74	1018.74
1.3	9.93	-0.54	1007.88	6.9	22.66	1.07	1018.13	13.0	23.41	0.74	1018.74
1.4	10.04	-0.54	1007.97	7.1	22.67	1.07	1018.14	13.1	23.43	0.74	1018.76
1.5	10.40	-0.54	1008.26	7.2	22.69	1.08	1018.16	13.2	23.43	0.74	1018.76
1.6	10.97	-0.55	1008.72	7.4	22.70	1.08	1018.16	13.3	23.46	0.73	1018.78
1.8	11.32	-0.57	1009.00	7.7	22.73	1.07	1018.19	13.7	23.44	0.73	1018.77
2.0	11.82	-0.58	1009.41	7.8	22.75	1.07	1018.21	13.8	23.46	0.74	1018.78
2.2	12.41	-0.57	1009.88	7.9	22.75	1.06	1018.21	14.0	23.44	0.74	1018.77
2.4	12.87	-0.54	1010.26	8.3	22.81	1.04	1018.25	14.1	23.45	0.74	1018.78
2.5	13.40	-0.50	1010.69	8.5	22.84	1.04	1018.28	14.2	23.45	0.74	1018.78
2.6	13.62	-0.49	1010.86	8.6	22.85	1.03	1018.29	14.3	23.45	0.74	1018.78
3.0	14.20	-0.40	1011.33	8.9	22.89	1.00	1018.32	14.4	23.46	0.74	1018.78
3.1	14.31	-0.37	1011.42	9.1	22.92	0.98	1018.34	14.6	23.46	0.74	1018.78
3.2	14.44	-0.32	1011.53	9.3	22.94	0.97	1018.36	14.7	23.46	0.74	1018.78
3.3	14.76	-0.24	1011.79	9.4	22.95	0.96	1018.37	14.9	23.46	0.74	1018.78
3.5	15.34	-0.14	1012.26	9.5	22.98	0.95	1018.39	15.1	23.46	0.74	1018.78
3.6	15.88	-0.06	1012.69	9.7	23.01	0.94	1018.42	15.3	23.47	0.74	1018.79
3.7	17.31	0.03	1013.85	10.1	23.05	0.91	1018.45	15.4	23.48	0.74	1018.80
3.8	18.02	0.09	1014.42	10.3	23.08	0.90	1018.47	15.5	23.48	0.74	1018.80
4.0	19.14	0.21	1015.32	10.4	23.10	0.89	1018.49	15.7	23.47	0.74	1018.79
4.2	20.37	0.36	1016.31	10.5	23.12	0.87	1018.51	15.8	23.48	0.74	1018.80
4.3	20.73	0.38	1016.60	10.6	23.13	0.87	1018.52	15.9	23.47	0.75	1018.79
4.5	21.00	0.43	1016.81	10.8	23.15	0.85	1018.53	16.1	23.48	0.74	1018.80
4.8	21.58	0.59	1017.28	11.0	23.16	0.84	1018.54	16.2	23.47	0.75	1018.79
5.1	21.79	0.69	1017.44	11.2	23.21	0.82	1018.58	16.3	23.47	0.75	1018.79
5.2	21.90	0.78	1017.53	11.4	23.22	0.81	1018.59	16.4	23.48	0.75	1018.80
5.4	22.09	0.86	1017.68	11.5	23.25	0.79	1018.61	16.5	23.47	0.76	1018.79
5.6	22.22	0.91	1017.78	11.9	23.33	0.77	1018.68	16.7	23.48	0.78	1018.80
5.7	22.29	0.94	1017.84	12.0	23.34	0.77	1018.69	16.8	23.47	0.81	1018.79
5.8	22.36	0.98	1017.89	12.1	23.37	0.76	1018.71				

STATION: 88002 DATE: 20 March

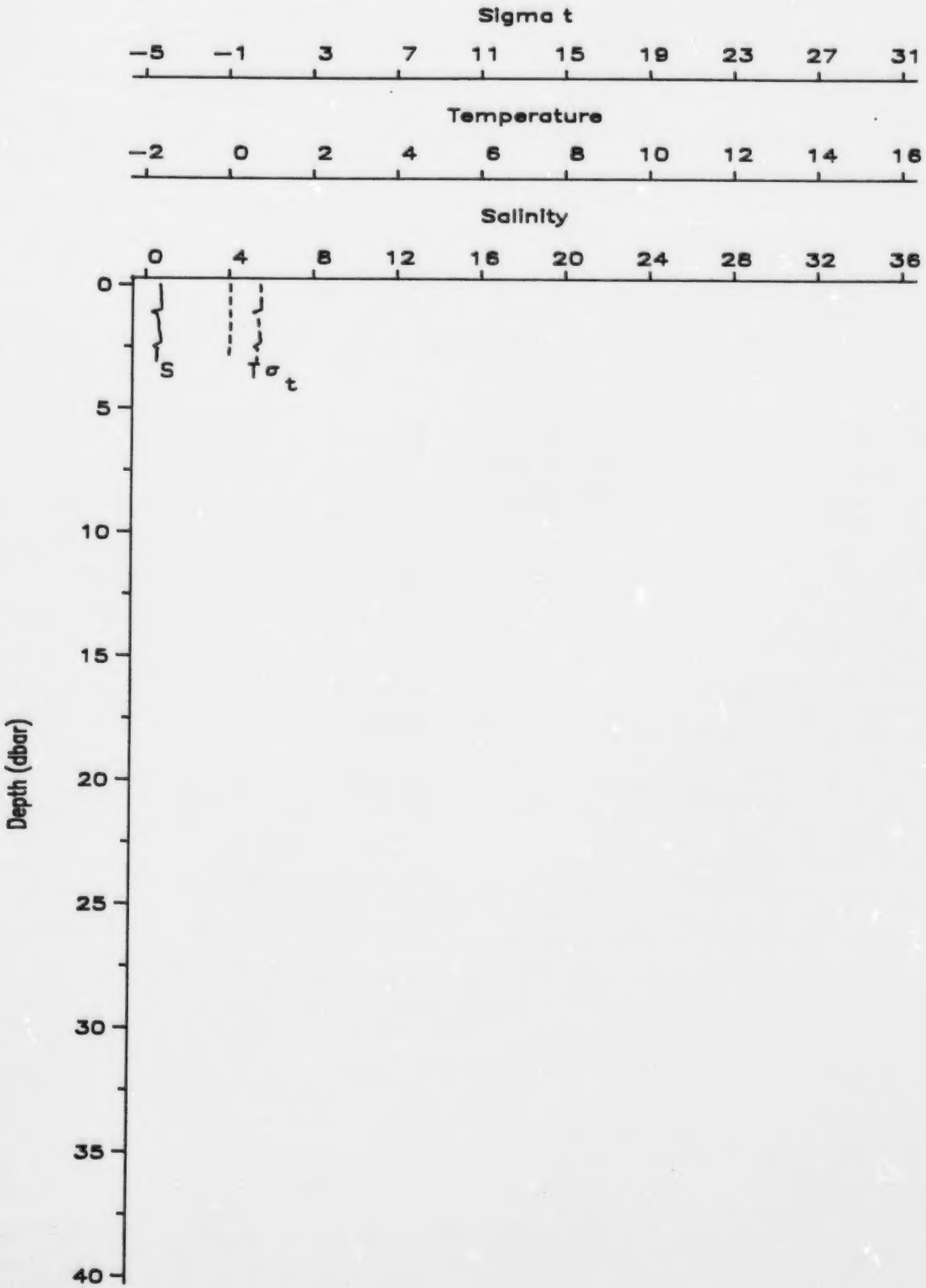

Table A1.2. Salinity, temperature (C) and density (kg.m**-3) data by depth (dbar) for station 88002, March 20, 1988.

Depth	Salinity	Temperature	Density	Depth	Salinity	Temperature	Density	Depth	Salinity	Temperature	Density
0.0	0.74	0.01	1000.45	1.1	0.35	0.01	1000.13	2.3	0.78	0.02	1000.48
0.1	0.77	0.02	1000.48	1.2	0.58	0.02	1000.32	2.5	0.43	-0.02	1000.19
0.3	0.79	0.02	1000.49	1.5	0.68	0.02	1000.40	2.6	0.61	0.01	1000.34
0.4	0.80	0.01	1000.50	1.9	0.71	0.01	1000.43	2.7	0.56	-0.01	1000.30
0.6	0.79	0.01	1000.49	2.0	0.75	0.01	1000.46	2.9	0.58	0.00	1000.32
0.8	0.82	0.01	1000.52	2.1	0.75	0.01	1000.46	3.0	0.55	0.00	1000.29
1.0	0.80	0.01	1000.50	2.2	0.79	0.01	1000.49	3.1	0.55	-0.01	1000.29

STATION: 88003 DATE: 21 March

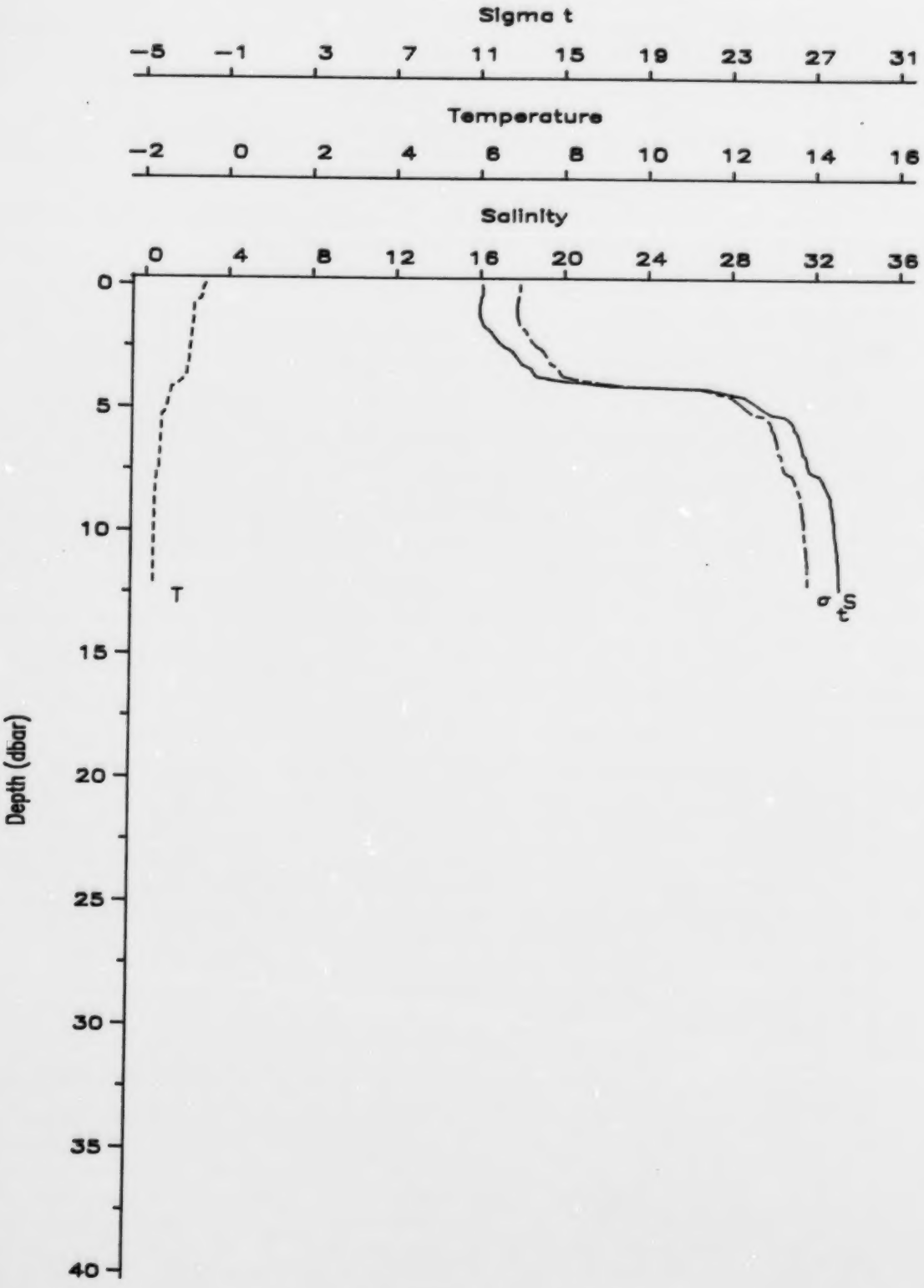

Table A1.3. Salinity, temperature (C) and density (kg.m**-3) data by depth (dbar) for station 88003, March 21, 1988.

Depth	Salinity	Temperature	Density	Depth	Salinity	Temperature	Density	Depth	Salinity	Temperature	Density
0.0	16.09	-0.58	1012.86	3.9	19.94	-1.12	1015.96	8.6	32.77	-1.75	1026.37
0.1	16.11	-0.61	1012.87	4.1	22.19	-1.24	1017.78	8.7	32.76	-1.75	1026.36
0.2	16.10	-0.64	1012.86	4.2	26.84	-1.37	1021.55	8.9	32.77	-1.75	1026.37
0.4	16.09	-0.62	1012.86	4.4	27.96	-1.39	1022.46	9.0	32.84	-1.75	1026.42
0.5	16.01	-0.67	1012.79	4.5	28.59	-1.42	1022.97	9.1	32.85	-1.75	1026.43
0.6	15.99	-0.68	1012.77	4.9	29.29	-1.47	1023.54	9.2	32.87	-1.76	1026.45
0.7	15.99	-0.79	1012.77	5.2	29.84	-1.53	1023.98	9.4	32.88	-1.75	1026.46
0.8	15.93	-0.85	1012.72	5.3	30.54	-1.59	1024.55	9.5	32.91	-1.76	1026.48
1.0	15.93	-0.85	1012.72	5.4	30.70	-1.60	1024.68	9.6	32.94	-1.76	1026.51
1.1	15.93	-0.86	1012.72	5.5	30.84	-1.60	1024.80	9.7	32.93	-1.76	1026.50
1.2	15.94	-0.86	1012.73	5.7	30.99	-1.61	1024.92	9.8	32.95	-1.76	1026.51
1.3	15.97	-0.86	1012.75	5.8	30.96	-1.61	1024.89	10.1	32.98	-1.76	1026.54
1.6	16.12	-0.88	1012.87	5.9	31.09	-1.61	1025.00	10.3	33.01	-1.76	1026.56
1.7	16.22	-0.88	1012.96	6.0	31.16	-1.61	1025.06	10.5	33.05	-1.77	1026.59
1.8	16.36	-0.88	1013.07	6.2	31.23	-1.62	1025.11	10.6	33.06	-1.77	1026.60
1.9	16.50	-0.90	1013.18	6.3	31.28	-1.62	1025.15	10.7	33.08	-1.77	1026.62
2.1	16.66	-0.91	1013.31	6.6	31.38	-1.63	1025.23	10.8	33.10	-1.77	1026.64
2.2	16.76	-0.91	1013.39	6.8	31.41	-1.63	1025.26	10.9	33.11	-1.77	1026.64
2.3	16.84	-0.91	1013.46	6.9	31.54	-1.64	1025.37	11.1	33.10	-1.77	1026.64
2.5	17.09	-0.93	1013.66	7.1	31.62	-1.65	1025.43	11.2	33.14	-1.77	1026.67
2.6	17.36	-0.94	1013.88	7.3	31.65	-1.65	1025.45	11.3	33.16	-1.77	1026.68
2.7	17.51	-0.94	1014.00	7.4	31.70	-1.65	1025.50	11.5	33.16	-1.77	1026.68
2.8	17.62	-0.95	1014.09	7.5	31.74	-1.65	1025.53	11.8	33.18	-1.77	1026.70
3.2	17.97	-0.97	1014.37	7.6	31.91	-1.69	1025.67	12.0	33.18	-1.77	1026.70
3.4	18.41	-1.01	1014.72	7.7	32.21	-1.71	1025.91	12.1	33.18	-1.77	1026.70
3.6	18.56	-1.01	1014.85	7.9	32.37	-1.72	1026.04	12.2	33.19	-1.77	1026.71
3.7	18.68	-1.03	1014.94	8.0	32.42	-1.73	1026.08	12.3	33.19	-1.77	1026.71
3.8	19.24	-1.08	1015.39	8.4	32.65	-1.74	1026.27				

STATION: 88004 DATE: 22 March

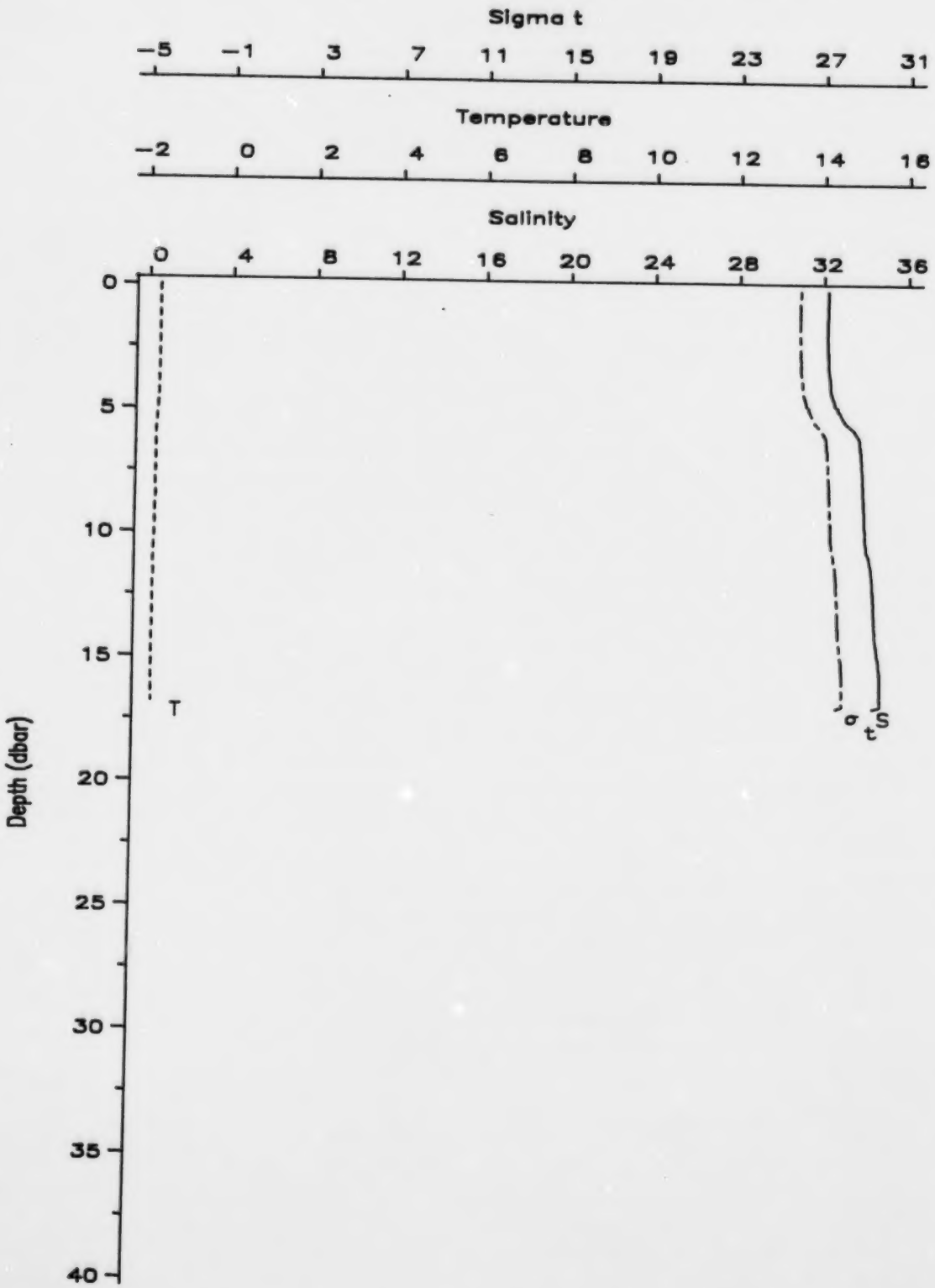

Table A1.4. Salinity, temperature (C) and density (kg.m**-3) data by depth (dbar) for station 88004, March 22, 1988.

Depth	Salinity	Temperature	Density	Depth	Salinity	Temperature	Density	Depth	Salinity	Temperature	Density
0.0	32.20	-1.74	1025.90	6.0	33.73	-1.82	1027.15	11.5	34.37	-1.85	1027.67
0.1	32.20	-1.75	1025.90	6.2	33.75	-1.82	1027.17	11.7	34.39	-1.85	1027.69
0.2	32.19	-1.75	1025.90	6.3	33.76	-1.82	1027.17	11.8	34.41	-1.86	1027.70
0.4	32.17	-1.75	1025.88	6.4	33.77	-1.82	1027.18	12.0	34.41	-1.86	1027.70
0.6	32.15	-1.75	1025.86	6.5	33.80	-1.82	1027.21	12.1	34.42	-1.86	1027.71
0.7	32.16	-1.75	1025.87	6.7	33.81	-1.82	1027.21	12.2	34.41	-1.86	1027.70
0.9	32.15	-1.75	1025.86	6.8	33.82	-1.82	1027.22	12.3	34.44	-1.86	1027.73
1.0	32.15	-1.75	1025.86	6.9	33.84	-1.82	1027.24	12.5	34.45	-1.86	1027.74
1.1	32.16	-1.75	1025.87	7.0	33.84	-1.82	1027.24	12.6	34.47	-1.86	1027.75
1.2	32.16	-1.75	1025.87	7.1	33.85	-1.82	1027.25	12.7	34.48	-1.86	1027.76
1.3	32.16	-1.75	1025.87	7.3	33.87	-1.82	1027.26	12.8	34.48	-1.86	1027.76
1.5	32.16	-1.75	1025.87	7.4	33.88	-1.82	1027.27	12.9	34.48	-1.86	1027.76
1.6	32.16	-1.75	1025.87	7.5	33.87	-1.82	1027.26	13.1	34.49	-1.86	1027.77
1.7	32.16	-1.75	1025.87	7.7	33.89	-1.82	1027.28	13.2	34.50	-1.86	1027.78
2.0	32.18	-1.75	1025.89	7.8	33.89	-1.83	1027.28	13.3	34.51	-1.86	1027.78
2.1	32.19	-1.75	1025.90	7.9	33.91	-1.83	1027.30	13.4	34.52	-1.86	1027.79
2.2	32.19	-1.75	1025.90	8.0	33.90	-1.82	1027.29	13.6	34.52	-1.86	1027.79
2.4	32.20	-1.75	1025.90	8.1	33.91	-1.82	1027.30	13.7	34.54	-1.86	1027.81
2.5	32.21	-1.75	1025.91	8.3	33.93	-1.82	1027.31	13.8	34.54	-1.86	1027.81
2.6	32.21	-1.75	1025.91	8.4	33.94	-1.82	1027.32	13.9	34.55	-1.86	1027.82
2.7	32.21	-1.75	1025.91	8.5	33.94	-1.82	1027.32	14.1	34.57	-1.87	1027.83
2.8	32.23	-1.75	1025.93	8.6	33.94	-1.82	1027.32	14.2	34.60	-1.87	1027.86
3.0	32.23	-1.75	1025.93	8.8	33.96	-1.82	1027.34	14.3	34.61	-1.87	1027.87
3.1	32.24	-1.75	1025.94	8.9	33.98	-1.83	1027.35	14.4	34.64	-1.87	1027.89
3.2	32.25	-1.75	1025.94	9.0	33.99	-1.83	1027.36	14.6	34.66	-1.87	1027.91
3.7	32.33	-1.76	1026.01	9.1	33.99	-1.83	1027.36	14.7	34.67	-1.87	1027.91
3.8	32.33	-1.76	1026.01	9.2	34.00	-1.83	1027.37	14.8	34.70	-1.87	1027.94
4.1	32.37	-1.76	1026.04	9.4	34.00	-1.83	1027.37	14.9	34.73	-1.87	1027.96
4.2	32.41	-1.76	1026.07	9.5	34.00	-1.82	1027.37	15.0	34.75	-1.87	1027.98
4.3	32.44	-1.76	1026.10	9.6	34.01	-1.83	1027.38	15.2	34.76	-1.86	1027.99
4.4	32.50	-1.76	1026.15	9.7	34.03	-1.83	1027.39	15.3	34.79	-1.87	1028.01
4.6	32.54	-1.77	1026.18	9.9	34.03	-1.83	1027.39	15.4	34.80	-1.87	1028.02
4.7	32.69	-1.77	1026.30	10.0	34.04	-1.83	1027.40	15.5	34.80	-1.87	1028.02
4.8	32.68	-1.78	1026.29	10.1	34.04	-1.83	1027.40	15.7	34.82	-1.87	1028.04
4.9	32.79	-1.78	1026.38	10.2	34.06	-1.84	1027.42	15.8	34.81	-1.87	1028.03
5.1	32.91	-1.79	1026.48	10.3	34.10	-1.85	1027.45	15.9	34.82	-1.86	1028.04
5.2	32.98	-1.79	1026.54	10.5	34.09	-1.84	1027.44	16.0	34.82	-1.87	1028.04
5.3	33.08	-1.80	1026.62	10.6	34.16	-1.85	1027.50	16.1	34.81	-1.87	1028.03
5.4	33.19	-1.80	1026.71	10.7	34.21	-1.85	1027.54	16.3	34.82	-1.86	1028.04
5.6	33.46	-1.81	1026.93	11.0	34.26	-1.85	1027.58	16.4	34.82	-1.87	1028.04
5.7	33.54	-1.81	1026.99	11.1	34.31	-1.86	1027.62	16.5	34.83	-1.87	1028.04
5.8	33.61	-1.82	1027.05	11.2	34.33	-1.85	1027.64	16.7	34.83	-1.86	1028.04
5.9	33.69	-1.82	1027.12	11.4	34.35	-1.85	1027.65	16.8	34.47	-1.86	1027.75

STATION: 88005 DATE: 23 March

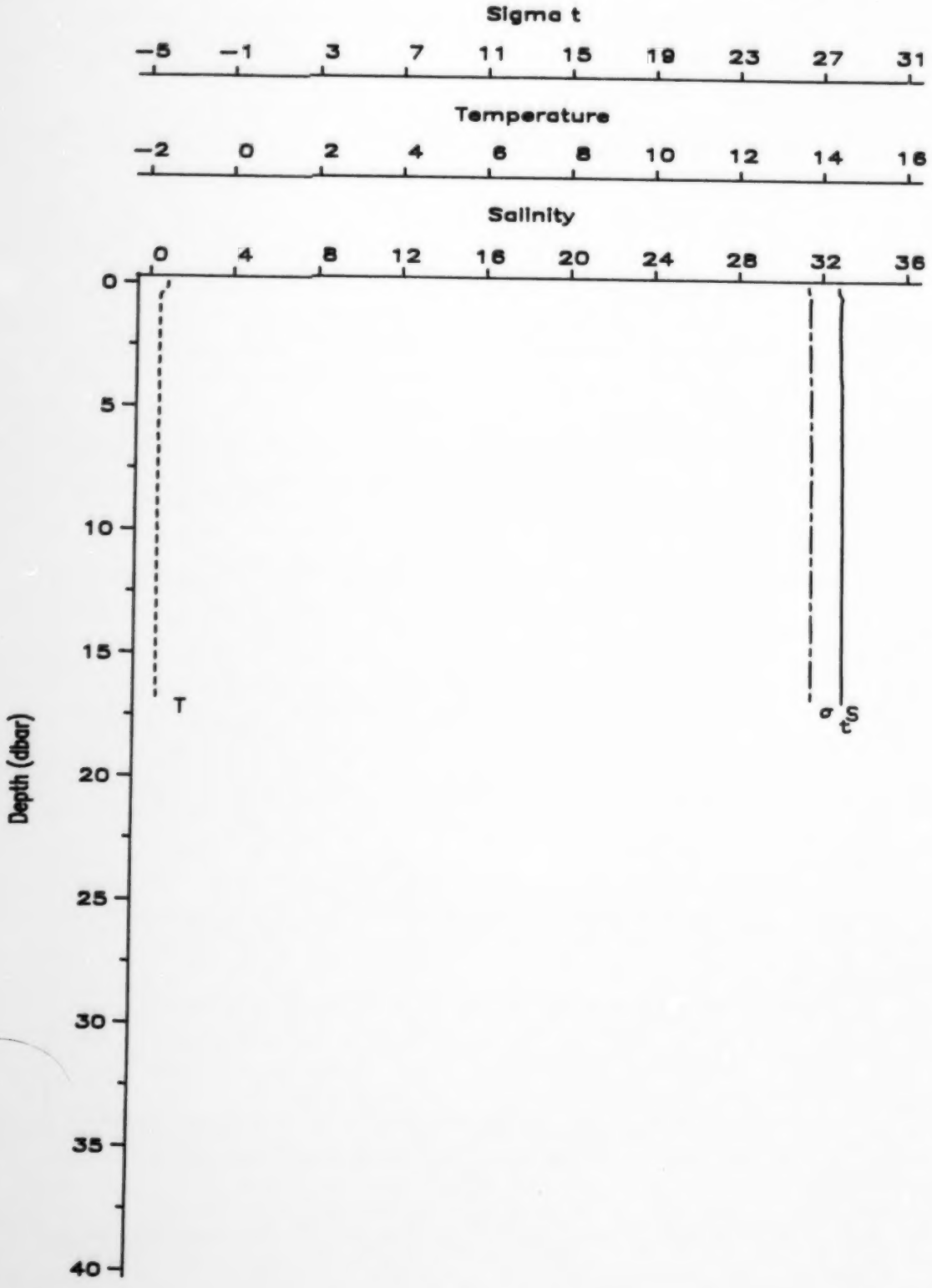

Table A1.5. Salinity, temperature (C) and density (kg.m**-3) data by depth (dbar) for station 88005, March 23, 1988.

Depth	Salinity	Temperature	Density	Depth	Salinity	Temperature	Density	Depth	Salinity	Temperature	Density
0.0	32.77	-1.58	1026.36	5.8	33.00	-1.76	1026.55	11.5	33.07	-1.77	1026.61
0.1	32.75	-1.58	1026.35	5.9	33.01	-1.77	1026.56	11.6	33.06	-1.77	1026.60
0.2	32.77	-1.58	1026.36	6.0	32.98	-1.77	1026.54	11.8	33.08	-1.77	1026.62
0.4	32.93	-1.68	1026.50	6.2	33.00	-1.77	1026.55	12.0	33.08	-1.77	1026.62
0.5	32.89	-1.75	1026.46	6.3	33.01	-1.76	1026.56	12.1	33.07	-1.77	1026.61
0.6	32.86	-1.76	1026.44	6.4	33.01	-1.76	1026.56	12.2	33.08	-1.77	1026.62
0.9	32.86	-1.76	1026.44	6.5	33.01	-1.76	1026.56	12.3	33.08	-1.77	1026.62
1.0	32.87	-1.76	1026.45	6.7	33.01	-1.76	1026.56	12.5	33.08	-1.77	1026.62
1.1	32.87	-1.76	1026.45	6.8	33.01	-1.76	1026.56	12.7	33.08	-1.77	1026.62
1.2	32.85	-1.76	1026.43	6.9	33.01	-1.76	1026.56	12.8	33.06	-1.77	1026.60
1.3	32.85	-1.76	1026.43	7.1	33.02	-1.77	1026.57	12.9	33.08	-1.76	1026.62
1.5	32.87	-1.76	1026.45	7.3	33.02	-1.76	1026.57	13.1	33.09	-1.77	1026.63
1.6	32.87	-1.76	1026.45	7.4	33.03	-1.76	1026.58	13.2	33.07	-1.77	1026.61
1.7	32.86	-1.76	1026.44	7.5	33.03	-1.77	1026.58	13.3	33.08	-1.77	1026.62
1.9	32.87	-1.76	1026.45	7.7	33.03	-1.77	1026.58	13.6	33.09	-1.77	1026.63
2.0	32.87	-1.76	1026.45	7.8	33.04	-1.77	1026.59	13.7	33.10	-1.77	1026.64
2.1	32.87	-1.76	1026.45	7.9	33.02	-1.77	1026.57	13.8	33.10	-1.77	1026.64
2.2	32.88	-1.76	1026.46	8.0	33.03	-1.77	1026.58	13.9	33.10	-1.77	1026.64
2.4	32.88	-1.76	1026.46	8.1	33.03	-1.76	1026.58	14.1	33.10	-1.77	1026.64
2.5	32.89	-1.76	1026.46	8.3	33.03	-1.77	1026.58	14.2	33.10	-1.77	1026.64
2.6	32.90	-1.76	1026.47	8.4	33.03	-1.77	1026.58	14.3	33.10	-1.77	1026.64
2.7	32.91	-1.77	1026.48	8.6	33.03	-1.77	1026.58	14.4	33.11	-1.77	1026.64
2.8	32.91	-1.76	1026.48	8.8	33.04	-1.77	1026.59	14.6	33.10	-1.77	1026.64
3.1	32.90	-1.76	1026.47	8.9	33.04	-1.77	1026.59	14.7	33.10	-1.77	1026.64
3.2	32.90	-1.76	1026.47	9.0	33.05	-1.76	1026.59	14.8	33.10	-1.77	1026.64
3.3	32.92	-1.77	1026.49	9.1	33.05	-1.77	1026.59	14.9	33.10	-1.77	1026.64
3.5	32.92	-1.77	1026.49	9.2	33.05	-1.77	1026.59	15.0	33.10	-1.77	1026.64
3.6	32.91	-1.76	1026.48	9.4	33.05	-1.77	1026.59	15.2	33.11	-1.77	1026.64
3.7	32.94	-1.77	1026.51	9.6	33.06	-1.77	1026.60	15.3	33.11	-1.77	1026.64
3.8	32.94	-1.76	1026.51	9.7	33.06	-1.77	1026.60	15.4	33.11	-1.77	1026.64
3.9	32.96	-1.76	1026.52	9.9	33.06	-1.77	1026.60	15.5	33.12	-1.77	1026.65
4.1	32.96	-1.76	1026.52	10.0	33.06	-1.76	1026.60	15.7	33.12	-1.77	1026.65
4.4	32.98	-1.76	1026.54	10.1	33.06	-1.77	1026.60	15.8	33.13	-1.77	1026.66
4.6	32.98	-1.76	1026.54	10.2	33.06	-1.77	1026.60	15.9	33.12	-1.76	1026.65
4.7	32.97	-1.76	1026.53	10.3	33.06	-1.77	1026.60	16.0	33.13	-1.76	1026.66
4.8	32.96	-1.76	1026.52	10.5	33.06	-1.77	1026.60	16.1	33.14	-1.76	1026.67
4.9	32.96	-1.76	1026.52	10.6	33.05	-1.77	1026.59	16.3	33.15	-1.76	1026.68
5.1	32.98	-1.76	1026.54	10.7	33.06	-1.77	1026.60	16.4	33.14	-1.76	1026.67
5.2	32.98	-1.76	1026.54	10.9	33.06	-1.77	1026.60	16.5	33.13	-1.76	1026.66
5.3	32.98	-1.76	1026.54	11.0	33.06	-1.77	1026.60	16.7	33.13	-1.76	1026.66
5.4	32.99	-1.76	1026.55	11.1	33.06	-1.77	1026.60	16.8	33.13	-1.76	1026.66
5.6	32.98	-1.76	1026.54	11.2	33.06	-1.77	1026.60				
5.7	32.99	-1.77	1026.55	11.4	33.08	-1.77	1026.62				